DOCUMENT RESUME

ED 324 845 EC 232 190

| | |
|---|---|
| TITLE | Preschool Children. Tech Use Guide: Using Computer Technology. |
| INSTITUTION | Council for Exceptional Children, Reston, VA. Center for Special Education Technology. |
| SPONS AGENCY | Special Education Programs (ED/OSERS), Washington, DC. |
| PUB DATE | Jun 89 |
| CONTRACT | 300-87-0115 |
| NOTE | 5p.; For related documents, see EC 232 187-195. |
| PUB TYPE | Guides - Non-Classroom Use (055) -- Reference Materials - Directories/Catalogs (132) |
| EDRS PRICE | MF01/PC01 Plus Postage. |
| DESCRIPTORS | Accessibility (for Disabled); Cognitive Development; Communication Skills; *Computer Assisted Instruction; *Computer Uses in Education; *Disabilities; *Input Output Devices; Instructional Material Evaluation; Language Acquisition; *Media Adaptation; Preschool Education; Speech Synthesizers |

ABSTRACT

One of nine brief guides for special educators on using computer technology, this guide focuses on uses with preschool children with either mild to severe disabilities. Especially noted is the ability of the computer to provide access to environmental experiences otherwise inaccessible to the young handicapped child. Appropriate technology for this age group, such as alternative input devices and alternative output devices, is explained, and the role of the computer in helping provide a more natural play environment is described. Suggestions are offered for using the computer to help the child develop communication, language, and cognitive skills. Ways to use the computer for assessment and to increase preschooler access to programs are pointed out. Features of good software for preschools include: clear, concise documentation; sound educational value; uncluttered, interesting use of color, graphics, and sound; adaptability; limited key input or alternative device usage; and data collection capability. A glossary of 14 terms is provided, as are lists of seven recommended readings, five periodicals, five software resources, six alternative input software resources, three speech synthesizers, three input devices, and five switch manufacturers. (DB)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

Center for Special Education Technology

# Tech Use Guide

## Using Computer Technology

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED324845

## Preschool Children

Babies and young children quickly learn that their daily interactions with the environment produce effects. Play is the child's way of learning. Looking, interacting, manipulating, crawling, toddling, and exploring are actions which begin early learning experiences. The sooner diversified experiences are introduced, the faster the child will learn to influence and control his or her environment.

Many children with disabilities are unable to interact with their environment. Thus, their development may be hindered. When early motor or intellectual experiences are restricted, delayed, or distorted, other lines of development are adversely affected as well. Lack of early experiences will affect later learning and socialization.

Young children with disabilities need early successful experiences in controlling their environment as do their peers without disabilities. Technology is one alternative which may provide successful opportunities when the child is unable to receive quality experiences through natural means. Many toys can be easily adapted so they can be controlled by a child who is severely physically disabled. Similar adaptations to a computer can provide access to a wide variety of computer-controlled environmental experiences for the very young child with disabilities.

Not only will technology benefit young children who are severely disabled, but will also augment the experiences and learning opportunities of children with mild disabilities. Computers can be used as a tool for learning other skills such as readiness concepts, visual motor coordination, and social skills. Children who use the computer at an early age will have the advantage of growing up with the technology and using it to their benefit throughout life. They stand to gain more and lose less through increased learning opportunities presented by the technology.

### The Technology

A computer system for a young child should allow the use of alternative input devices and provide good color graphic output. Most young children are not ready for the standard computer keyboard thus alternatives should be available that easily connect to the basic computer system. These may include alternative keyboards, touch pads, pointing devices, and switches. Most programs for young children utilize color graphics, sound, and motion rather than written text so alternative output devices may be required. These may include a color monitor, voice synthesizer, or an environmental control unit.

### Play

Within the natural play environment, many developmental opportunities are presented in unstructured ways. Toys and other objects are found to entertain, allow curiosity to develop, and provide opportunities for motor coordination and language development. For children with physical limitations who cannot independently participate in these unstructured play environments, the technology can help structure similar play opportunities that promote positive interactions. A simple example is using a battery operated toy equipped with a switch (such as a train or animal) to give control of play activity to the child. By activating the switch (e.g., pressing, touching, or rolling on top of it) the child can manipulate the toy. Infants as young as three months have "played" in computer-controlled environments to discover relationships between their actions and objects in their environment. These planned environments can also encourage motor development by positioning toys to encourage arm placement, pointing, and posture control.

As children grow older they love to play games. Preschoolers are just beginning to learn cooperative play. Computers offer unique opportunities to play games because they can direct turn taking and neutralize some of the motor skills needed to play. Consequently they can provide a recreational outlet for many nonverbal children and children with severe physical disabilities as well as their peers without disabilities. For example, a computer can simulate a board game. Using a switch or other alternative input device, the child activates the computer-generated spinner and moves to the next spun color or number space. Other examples include moving target games, matching exercises, and story boards.

### Learning

During the early development years there is little differentiation between communication, language, and cognition. Early communication begins with intentional actions that gain someone's attention. The child with very severe disabilities may have no means to achieve this goal. Toys and buzzers activated by simple switches could be used for this early rudimentary communication task. A computer system can also be designed to assist with communication on this very early developmental level and can also be designed to assist on highly sophisticated levels, depending on the user's

EC 232460

A Project of The Council for Exceptional Children
Funded by The Office of Special Education and Rehabilitative Services, U.S. Department of Education

needs. This versatility makes the computer a viable option for communication devices — it can change with the changing communication needs of the user. For more information about this topic request the Tech Use Guide on Augmentative Communication from the Center.

There are several ways the computer can be used to assist in the development of language skills. The computer can function as a beginning communication device and language acquisition aid. Some of the alternative keyboards have authoring programs that allow the board to be used as an alternative communication device or as a talking board that teaches and reinforces language concepts. Vocabulary with these programs can be changed in a matter of minutes.

Other programs are designed to teach higher level expressive and receptive language skills. Talking word processors which pronounce letters, numbers, words, phrases, and full text can be used to introduce language to students. In this application the computer becomes a tool for teaching reading and writing as well as language and communication.

In addition to language skills, computers can be used to teach independence. With a switch operated toy, a child can learn cause/effect relationships and choice selection and improve memory skills. These are just some of the basic skills needed to learn other skills later.

Motor and perceptual skill development are two other areas of learning in which the computer can assist the young child with disabilities. Visual-perceptual skills can be taught and reinforced through the use of simple game-like programs that use moving visual targets and timed motor responses to gain reinforcement. Another motor training application is the use of switches to promote postural changes or specific muscle movements. An example is placing a mercury switch on a child's head — when the child brings his or head to an upright position, the tape player turns on reinforcing music.

## Assessment

The computer can provide an opportunity to assess children at an earlier age. Alternative input devices allow the child to demonstrate cognitive abilities unhampered by delayed motor abilities. For example, with a touch sensitive screen, the child merely touches the computer screen to indicate a selection. Or a child can touch a picture which is placed on an alternative keyboard (e.g., Power Pad or Unicorn Board). By using these and other devices, the teacher can be more assured of assessing the target cognitive skill rather than the child's motor disability.

## Access

For many preschoolers, including those with disabilities, the standard keyboard is not the best input method. Tiny hands often have a hard time pressing the small keys. Also, many preschoolers are nonreaders and have not mastered the alphabet, let alone the keyboard. Well designed software programs for young children overcome these barriers. Often preschool software programs only use a handful of keys. By highlighting the keys or blocking all others out, the child can become very successful with the task at hand. Stickers placed on important function keys (e.g., spacebar or return), keyguards, or a homemade mask which denotes only a specific key area, are some helpful and easy solutions.

For children who need more than a minor modification, other alternatives include joysticks, game paddles, light pens, touch windows, a mouse, or expanded keyboards. These commonly available devices require specially written, but fairly common, software. Other specialty input devices such as switches, eyetrackers, and headpointers require special purchase and special programs. Many alternative keyboards require special software. Sometimes an adapative firmware card will need to be installed in the computer before an alternative keyboard, switch, or scanning device can be used.

Selecting the appropriate device will depend on the specific needs of the child. For more information about this topic, request the Tech Use Guide on Computer Access from the Center.

## Software

Before selecting any software program, determine the prerequisite skills needed to operate the program and the functioning level of the preschooler. These criteria are very important and should influence your decision. When teachers and parents first introduce a computer to a child, the goals should be to allow the child to use it as independently as possible, have a positive experience, feel in control, and be successful. Important features that software for preschoolers should possess include:

- **Clear, concise documentation.** The documentation or teacher's guide should be easy to read and informative.
- **Sound educational value.** Software should support the curriculum, reinforce correct answers, provide cues for incorrect answers, not provide rewards for incorrect answers (they should be ignored), and present a reading level that matches the child's ability.
- **Color, graphics, and sound.** Software should be colorful, interesting, animated, and enhanced with sound. Screens should be uncluttered, shapes easily recognizable, and if print appears on the screen it should be large enough for a preschooler to read. If a child is prone to seizures, avoid programs with flashing lights or graphics which may activate a seizure.
- **Adaptability.** The program should be modifiable. You should be able to change the level of difficulty, content, speed of presentation to fit the child.
- **Limited key input or alternative device usage.** Many preschoolers cannot use standard keyboard. As already mentioned the keys are too small, too close together, require too much pressure to activiate, are too far from the child's reach, or are not in sequential order. Limiting key input to one or two keys is one solution, alternative devices are another.

- **Data collection.** If you are using the software for training or instruction, a management program is desirable. Information such as the number of correct responses, number of trials, or actual raw data will help you plan the child's program more effectively.

While you may think of other features that are important for the individual needs of your students, this guide will help you get started. Develop a list of features that are most important for your students. Narrow your selection to two or three programs. Review all programs before any are purchased.

## Glossary

**Adaptive Firmware Card (AFC)** — The AFC is a small circuit board that is placed inside the computer. A small external connector box, which comes with the AFC, is mounted on the side of the computer. Switching devices plug into this connector box. The AFC allows the computer to be accessed by a variety of 16 input methods, depending on the physical ability of the user and the type of switch needed. Various input methods include: expanded keyboards, switches, morse code, and augmentative communication devices. The AFC also has several other features which are appropriate for use with young children. For example, one feature allows one to slow down the speed of the computer and thus slow down the action of an arcade-type computer game.

**Alternative input device** — Traditional or standard input to a computer is the keyboard. However, for many children with disabilities, standard input devices are a barrier to computer use. Non-traditional or alternative input devices have been designed to give the child a means to access the computer. These include expanded keyboards, switches, joysticks, touch windows or voice input.

**Alternative keyboards** — Touch sensitive boards which attach easily to the computer and bypass the standard keyboard as the input device are known as alternative keyboards. Some keyboards, through special programming, can change the definition and size of the keys to be altered by allowing several adjacent keys to act as one large key. Keyboards vary on the degree of pressure needed to activate the software.

**Detachable keyboard** — A keyboard that is not attached to the central processing unit (CPU) of the computer. A detachable keyboard usually attaches to the computer via a coiled cable much like that of a telephone cord. This keyboard can be placed just about any place the cord will reach (e.g., in a child's lap or on the floor).

**Expanded keyboard** — A large, oversized keyboard that replaces the traditional keyboard. Examples include the Muppet Learning Keys, the Power Pad, and the Unicorn Board.

**Keyguard** — A plastic or metal sheet with finger-size holes in it that correspond to the key locations of the keyboard. The keyguard is placed over the computer keyboard to help people with poor motor control select the right keys. Some have latching keys that allow the user to hold down two keys at once with only one finger or a headstick.

**Mask** — A device that is placed over a keyguard to block out extraneous keys and to place focus on a specific key area (e.g., return key). These are usually made out of cardboard and are noncommercial.

**Membrane keyboard** — A keyboard which is similar in function to a standard keyboard, but is generally more rugged and larger. The membrane protects the keyboard circuitry from moisture or spills. Some membrane keyboards are also programmable for added flexibility. Examples include the Muppet Learning Keys and the Power Pad.

**Speech input** — The ability of a microcomputer to recognize speech as a form of data input.

**Speech output** — A method of output that enables a computer to reproduce speech via a speech synthesizer.

**Speech recognition** — The technology of making a computer understand human speech, which makes it possible to transmit data or instructions to a computer with voice commands.

**Speech synthesizer** — A method of output that enables a computer to reproduce speech.

**Switch** — A device that allows alternative access to a computer or battery operated toys. The most common switches are push, lever, leaf, wrinkle, and sip and puff. Pressure against a switch turns it on while release of this pressure turns the switch off.

**Touch sensitive** — A touch sensitive device is a method of input which is activated by a light pressure of the hand or stylus.

## Readings

Burkhart, L. J. (1982). More homemade battery devices for severely handicapped children with suggested activities. College Park, MD: Author. Available from L. J. Burkhart, 8503 Rhode Island Avenue, College Park, MD 20740.

Burkhart, L. J. (1987). Using computers and speech synthesis to facilitate communicative interaction with young and/or severely handicapped children. College Park, MD: Author. Available from L. J. Burkhart, 8503 Rhode Island Avenue, College Park, MD 20740.

Morris, K. J. (1989). Alternative computer access methods for young handicapped children. Closing The Gap, 7(6), 1-15.

Pressman, H. (1987). Making an exceptional difference: Enhancing the impact of microcomputer technology on children with disabilities. Boston, MA: Exceptional Parent.

Rauschert, M., & Schneider, C. (1988). The use of robots in the preschool handicapped classroom. Closing The Gap, 7(4), 24-25.

Robinson, L., & Rauschert, M. (1988). Computer technology as a tool for preschool handicapped children. Closing The Gap, 7(4), 26-29.

Wright, C., & Nomura M. (1985). From toys to computers: Access for the physically disabled child. San Jose, CA: Author.

## Periodicals

Closing The Gap, P.O. Box 68, Henderson, MN 56044.

Exceptional Parent, 1170 Commonwealth Avenue, Third Floor, Boston, MA 02134.

Journal of Early Intervention, The Division for Early Childhood, The Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091.

Teaching Exceptional Children, The Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091.

Topics in Early Childhood Special Education, PRO-ED, 5341 Industrial Oaks Boulevard, Austin, TX 78735-8809.

## Software Resource List

**Alphabet Circus,** DLM Teaching Resources, One DLM Park, Allen, TX 75002, 800-527-4747.

**Early Games for Young Children,** Springboard Software, Inc., 7807 Creekridge Circle, Minneapolis, MN 55435, 612-944-3912.

**Keytalk,** Peal Software, Inc., 2210 Wilshire Boulevard, Suite 806, Santa Monica, CA 90403, 213-451-0997.

**Language Development Series,** Scott, Foresman & Company, 1900 East Lake Avenue, Glenview, IL 60025, 312-273-5900.

**Reading Readiness: Visual Discrimination,** EMC Publishing, 300 York Avenue, St. Paul, MN 55101, 800-328-1452.

## Alternative Input Software Resource List

**Alphabet With Tom and Andy,** Dunamis, Inc., 2856 Buford Highway, Duluth, GA 30136, 404-476-4934.

**Exploratory Play,** Peal Software, Inc., 2210 Wilshire Boulevard, Suite 806, Santa Monica, CA 90403, 213-451-0997.

**First Words,** Laureate Learning Systems, Inc., 110 East Spring Street, Winooski, VT 05404, 802-655-4755.

**Gertrude's Secrets,** The Learning Company, 6493 Kaiser Drive, Fremont, CA 94555.

**Keys to Success: Computer Keyboard Skills for Blind Children,** Life Science Associates, 1 Fenimore Road, Bayport, NY 11705, 516-472-2111.

**The New Talking Stickybear Alphabet,** Optimum Resource, Inc., 10 Station Place, Norfolk, CT 06058, 800-327-1473.

## Speech Synthesizers

**Cybertalker,** Cyberon Corporation, 1175 Wendy Road, Ann Arbor, MI 48103, 313-665-8512.

**The Echo Family of Speech Synthesizers,** Street Electronics Corporation, 1140 Mark Avenue, Carpinteria, CA 93013, 805-684-4593.

**Personal Speech System,** Votrax, Inc., 1394 Rankin Road, Troy, MI 48083-4074, 800-521-1350.

## Input Devices

**Muppet Learning Keys,** Sunburst Communications, 39 Washington Avenue, Room EP, Pleasantville, NY 10570, 800-431-1934.

**TouchWindow,** Edmark Corporation, 14350 North East 21st Street, Bellevue, WA 98009-3903, 800-426-0856.

**Unicorn Expanded Keyboard,** Unicorn Engineering Company, 6201 Harwood Avenue, Oakland, CA 94618, 415-428-1626.

## Switch Manufacturers

**CompuAbility Corporation,** 101 Route 46 East, Pine Brook, NJ 07058, 201-882-0171.

**Don Johnston Developmental Equipment,** 200 Winnetka Terrace, Lake Zurich, IL 60047, 312-438-3476.

**Prentke Romich Company,** 1022 Heyl Road, Wooster, OH 44691, 216-262-1984.

**Steven E. Kanor, Ph.D. Inc.,** 8 Main Street, Hastings-on-Hudson, NY 10706, 914-478-0960.

**TASH (Technical Aids & Systems for the Handicapped, Inc.),** 70 Gibson Drive, Unit 12, Markham, Ontario, Canada L3R 4C2, 416-475-2212.

The information in this **Tech Use Guide** is in the public domain. Readers are encouraged to copy and share it, but please credit the Center for Special Education Technology. Please notify the Center of large quantity distributions.

Additional **Tech Use Guides** on the following topics are available from the Center upon request:

- Guide for Teachers
- Guide for Parents
- Technology for Work, Home, and Leisure
- Computer Access
- Selecting Software
- Selecting Hardware
- Learning Disabilities
- Hearing Impairments
- Physical Disabilities
- Visual Impairments
- Telecommunication Networks
- Augmentation Communication

This material was developed by the Center for Special Education Technology under Contract No. 300-87-0115 with the Office of Special Education Programs, U.S. Department of Education. The content, however, does not necessarily reflect the position or policy of OSEP/ED and no official endorsement of the material should be inferred.